Science
Office of Science

Funding by Site by Program

(dollars in thousands)

	FY 2003	FY 2004	FY 2005	$ Change	% Change
Chicago Operations Office					
Ames Laboratory					
Basic Energy Sciences	17,970	18,310	16,547	-1,763	-9.6%
Advanced Scientific Computing Research	1,873	1,587	1,538	-49	-3.1%
Biological and Environmental Research	887	305	0	-305	-100.0%
Science Laboratories Infrastructure	0	150	150	0	0.0%
Safeguards and Security	395	409	505	+96	+23.5%
Total, Ames Laboratory	21,125	20,761	18,740	-2,021	-9.7%
Argonne National Laboratory – East					
Basic Energy Sciences	156,193	169,725	171,403	+1,678	+1.0%
Advanced Scientific Computing Research	12,413	11,394	10,682	-712	-6.2%
Fusion Energy Sciences	1,333	920	976	+56	+6.1%
High Energy Physics	9,539	8,926	9,512	+586	+6.6%
Nuclear Physics	20,829	17,720	19,098	+1,378	+7.8%
Biological and Environmental Research	25,048	26,423	24,454	-1,969	-7.5%
Science Laboratories Infrastructure	4,107	5,901	2,120	-3,781	-64.1%
Workforce Development for Teachers and Scientists	1,550	1,307	2,560	+1,253	+95.9%
Safeguards and Security	7,680	7,651	9,784	+2,133	+27.9%
Total, Argonne National Laboratory	238,692	249,967	250,589	+622	+0.2%
Brookhaven National Laboratory					
Basic Energy Sciences	65,782	67,649	80,382	+12,733	+18.8%
Advanced Scientific Computing Research	1,162	761	611	-150	-19.7%
High Energy Physics	36,342	22,022	19,884	-2,138	-9.7%
Nuclear Physics	146,721	147,861	155,892	+8,031	+5.4%
Biological and Environmental Research	18,638	18,531	17,960	-571	-3.1%
Science Laboratories Infrastructure	8,244	6,696	4,758	-1,938	-28.9%
Workforce Development for Teachers and Scientists	517	517	725	+208	+40.2%
Safeguards and Security	10,929	10,756	11,342	+586	+5.4%
Total, Brookhaven National Laboratory	288,335	274,793	291,554	+16,761	+6.1%

	(dollars in thousands)				
	FY 2003	FY 2004	FY 2005	$ Change	% Change
Fermi National Accelerator Laboratory					
Advanced Scientific Computing Research	226	115	146	+31	+27.0%
High Energy Physics	313,506	300,311	303,629	+3,318	+1.1%
Nuclear Physics	48	0	0	0	0.0%
Science Laboratories Infrastructure	362	233	125	-108	-46.4%
Workforce Development for Teachers and Scientists	50	70	98	+28	+40.0%
Safeguards and Security	2,805	2,837	3,067	+230	+8.1%
Total, Fermi National Accelerator Laboratory	316,997	303,566	307,065	+3,499	+1.2%
Chicago Operations Office					
Basic Energy Sciences	132,240	132,967	117,872	-15,095	-11.4%
Advanced Scientific Computing Research	27,512	20,199	23,902	+3,703	+18.3%
Fusion Energy Sciences	50,484	120,796	123,308	+2,512	+2.1%
High Energy Physics	81,571	115,797	109,613	-6,184	-5.3%
Nuclear Physics	55,659	69,550	66,011	-3,539	-5.1%
Biological and Environmental Research	130,017	111,901	96,167	-15,734	-14.1%
Science Laboratories Infrastructure	1,007	0	1,520	+1,520	+100.0%
Science Program Direction	32,043	37,924	39,517	+1,593	+4.2%
SBIR/STTR	87,495	0	0	0	0.0%
Total, Chicago Operations Office	598,028	609,134	577,910	-31,224	-5.1%
Princeton Plasma Physics Laboratory					
Advanced Scientific Computing Research	455	150	345	+195	+130.0%
Fusion Energy Sciences	62,230	70,454	67,977	-2,477	-3.5%
High Energy Physics	225	225	364	+139	+61.8%
Science Laboratories Infrastructure	545	980	0	-980	-100.0%
Workforce Development for Teachers and Scientists	90	80	110	+30	+37.5%
Safeguards and Security	3,489	1,855	1,945	+90	+4.9%
Total, Princeton Plasma Physics Laboratory	67,034	73,744	70,741	-3,003	-4.1%
Total, Chicago Operations Office	1,542,888	1,531,965	1,516,599	-15,366	-1.0%

	(dollars in thousands)				
	FY 2003	FY 2004	FY 2005	$ Change	% Change
Idaho Operations Office					
Idaho National Engineering and Environmental Laboratory					
Basic Energy Sciences	1,911	1,045	1,494	+449	+43.0%
Fusion Energy Sciences	2,322	2,048	2,172	+124	+6.1%
Biological and Environmental Research	3,073	3,750	3,495	-255	-6.8%
Workforce Development for Teachers and Scientists	70	90	100	+10	+11.1%
Total, Idaho National Engineering and Environmental Laboratory	7,376	6,933	7,261	+328	+4.7%
Idaho Operations Office					
Biological and Environmental Research	4,805	5,456	1,135	-4,321	-79.2%
Total, Idaho Operations Office	12,181	12,389	8,396	-3,993	-32.2%
Livermore Site Office					
Lawrence Livermore National Laboratory					
Basic Energy Sciences	4,374	4,537	4,676	+139	+3.1%
Advanced Scientific Computing Research	5,965	5,313	3,023	-2,290	-43.1%
Fusion Energy Sciences	14,114	14,266	13,408	-858	-6.0%
High Energy Physics	1,531	650	436	-214	-32.9%
Nuclear Physics	823	690	500	-190	-27.5%
Biological and Environmental Research	22,351	24,426	23,645	-781	-3.2%
Science Laboratories Infrastructure	250	250	300	+50	+20.0%
Total, Lawrence Livermore National Laboratory	49,408	50,132	45,988	-4,144	-8.3%
Los Alamos Site Office					
Los Alamos National Laboratory					
Basic Energy Sciences	29,554	34,192	23,663	-10,529	-30.8%
Advanced Scientific Computing Research	3,990	3,448	3,030	-418	-12.1%
Fusion Energy Sciences	6,661	3,868	3,574	-294	-7.6%
High Energy Physics	964	695	825	+130	+18.7%
Nuclear Physics	9,678	8,963	9,107	+144	+1.6%
Biological and Environmental Research	24,091	21,134	19,600	-1,534	-7.3%
Total, Los Alamos National Laboratory	74,938	72,300	59,799	-12,501	-17.3%

	(dollars in thousands)				
	FY 2003	FY 2004	FY 2005	$ Change	% Change
NNSA Service Center/Albuquerque					
Golden Field Office					
Workforce Development for Teachers and Scientists	200	265	350	+85	+32.1%
National Renewable Energy Laboratory					
Basic Energy Sciences	5,598	5,705	4,562	-1,143	-20.0%
Advanced Scientific Computing Research	0	150	0	-150	-100.0%
Total, National Renewable Energy Laboratory	5,598	5,855	4,562	-1,293	-22.1%
NNSA Service Center/Albuquerque					
Biological and Environmental Research	850	850	850	0	0.0%
Total, NNSA Service Center/Albuquerque	6,648	6,970	5,762	-1,208	-17.3%
NNSA Service Center/Oakland					
Lawrence Berkeley National Laboratory					
Basic Energy Sciences	96,683	121,083	106,615	-14,468	-11.9%
Advanced Scientific Computing Research	55,348	56,020	54,886	-1,134	-2.0%
Fusion Energy Sciences	6,140	5,909	5,909	0	0.0%
High Energy Physics	43,507	39,339	38,323	-1,016	-2.6%
Nuclear Physics	20,435	16,407	17,955	+1,548	+9.4%
Biological and Environmental Research	66,885	66,946	64,207	-2,739	-4.1%
Science Laboratories Infrastructure	6,961	2,500	6,185	+3,685	+147.4%
Workforce Development for Teachers and Scientists	572	705	783	+78	+11.1%
Science Program Direction	0	0	50	+50	+100.0%
Safeguards and Security	4,649	4,689	5,165	+476	+10.2%
Total, Lawrence Berkeley National Laboratory	301,180	313,598	300,078	-13,520	-4.3%
NNSA Service Center/Oakland					
Basic Energy Sciences	29,487	0	0	0	0.0%
Advanced Scientific Computing Research	2,495	0	0	0	0.0%
Fusion Energy Sciences	69,520	4,644	0	-4,644	-100.0%
High Energy Physics	37,895	0	0	0	0.0%
Nuclear Physics	15,849	0	0	0	0.0%
Biological and Environmental Research	36,048	0	0	0	0.0%
SBIR/STTR	12,677	0	0	0	0.0%
Total, NNSA Service Center/Oakland	203,971	4,644	0	-4,644	-100.0%

	(dollars in thousands)				
	FY 2003	FY 2004	FY 2005	$ Change	% Change
Stanford Linear Accelerator Center					
Basic Energy Sciences	45,313	43,629	85,218	+41,589	+95.3%
Advanced Scientific Computing Research	613	281	160	-121	-43.1%
High Energy Physics	160,033	168,982	169,175	+193	+0.1%
Biological and Environmental Research	5,450	3,675	3,200	-475	-12.9%
Science Laboratories Infrastructure	13	2,138	7,508	+5,370	+251.2%
Workforce Development for Teachers and Scientists	150	150	150	0	0.0%
Safeguards and Security	2,211	2,207	2,341	+134	+6.1%
Total, Stanford Linear Accelerator Center	213,783	221,062	267,752	+46,690	+21.1%
Total, NNSA Service Center/Oakland	706,257	539,304	567,830	+28,526	+5.3%
Oak Ridge Operations Office					
Oak Ridge Institute For Science and Education					
Basic Energy Sciences	2,130	1,069	872	-197	-18.4%
Advanced Scientific Computing Research	325	250	200	-50	-20.0%
Fusion Energy Sciences	896	1,002	919	-83	-8.3%
High Energy Physics	130	0	130	+130	+100.0%
Nuclear Physics	726	678	669	-9	-1.3%
Biological and Environmental Research	5,848	4,161	3,977	-184	-4.4%
Science Laboratories Infrastructure	0	0	565	+565	+100.0%
Workforce Development for Teachers and Scientists	1,217	1,132	1,340	+208	+18.4%
Science Program Direction	25	0	55	+55	+100.0%
Safeguards and Security	1,250	1,254	1,410	+156	+12.4%
Total, Oak Ridge Institute for Science and Education	12,547	9,546	10,137	+591	+6.2%
Oak Ridge National Laboratory					
Basic Energy Sciences	365,058	277,590	235,239	-42,351	-15.3%
Advanced Scientific Computing Research	34,894	20,677	21,833	+1,156	+5.6%
Fusion Energy Sciences	20,935	20,236	19,868	-368	-1.8%
High Energy Physics	663	200	623	+423	+211.5%
Nuclear Physics	18,188	19,484	20,423	+939	+4.8%
Biological and Environmental Research	46,204	43,360	39,431	-3,929	-9.1%
Science Laboratories Infrastructure	12,839	10,360	780	-9,580	-92.5%
Safeguards and Security	9,433	6,894	8,713	+1,819	+26.4%
Total, Oak Ridge National Laboratory	508,214	398,801	346,910	-51,891	-13.0%

	(dollars in thousands)				
	FY 2003	FY 2004	FY 2005	$ Change	% Change
Office of Scientific Technical Information					
Advanced Scientific Computing Research	10	10	0	-10	-100.0%
Biological and Environmental Research	22	236	236	0	0.0%
Safeguards and Security	265	60	590	+530	+883.3%
Workforce Development for Teachers and Scientists	75	80	90	+10	+12.5%
Total, Office of Scientific Technical Information	372	386	916	+530	+137.3%
Thomas Jefferson National Accelerator Facility					
Advanced Scientific Computing Research	19	0	0	0	0.0%
High Energy Physics	10	0	0	0	0.0%
Nuclear Physics	80,060	81,601	86,345	+4,744	+5.8%
Biological and Environmental Research	1,080	775	525	-250	-32.3%
Science Laboratories Infrastructure	1,481	9,019	0	-9,019	-100.0%
Workforce Development for Teachers and Scientists	10	261	291	+30	+11.5%
Safeguards and Security	1,132	972	1,174	+202	+20.8%
Total, Thomas Jefferson National Accelerator Facility	83,792	92,628	88,335	-4,293	-4.6%
Oak Ridge Operations Office					
Biological and Environmental Research	464	373	371	-2	-0.5%
Science Laboratories Infrastructure	5,015	5,049	5,079	+30	+0.6%
Science Program Direction	44,116	48,556	50,134	+1,578	+3.2%
Safeguards and Security	11,593	11,688	15,872	+4,184	+35.8%
Total, Oak Ridge Operations Office	61,188	65,666	71,456	+5,790	+8.8%
Total, Oak Ridge Operations Office	666,113	567,027	517,754	-49,273	-8.7%

	(dollars in thousands)				
	FY 2003	FY 2004	FY 2005	$ Change	% Change
Richland Operations Office					
Pacific Northwest National Laboratory					
Basic Energy Sciences	13,115	13,821	11,648	-2,173	-15.7%
Advanced Scientific Computing Research	3,932	2,839	2,826	-13	-0.5%
Fusion Energy Sciences	1,436	1,365	1,384	+19	+1.4%
High Energy Physics	49	0	0	0	0.0%
Nuclear Physics	49	0	0	0	0.0%
Biological and Environmental Research	85,304	86,912	80,287	-6,625	-7.6%
Science Laboratories Infrastructure	0	1,979	0	-1,979	-100.0%
SLI — use of prior year balances	0	-3,950	0	+3,950	+100.0%
Workforce Development for Teachers and Scientists	748	838	931	+93	+11.1%
Science Program Direction	63	0	0	0	0.0%
Safeguards and Security	10,716	10,721	11,070	+349	+3.3%
Total, Pacific Northwest National Laboratory	115,412	114,525	108,146	-6,379	-5.6%
Richland Operations Office					
Workforce Development for Teachers and Scientists	25	0	0	0	0.0%
Total, Richland Operations Office	115,437	114,525	108,146	-6,379	-5.6%
Sandia Site Office					
Sandia National Laboratories					
Basic Energy Sciences	31,047	47,260	54,548	+7,288	+15.4%
Advanced Scientific Computing Research	9,735	9,318	8,572	-746	-8.0%
Fusion Energy Sciences	3,107	2,678	2,812	+134	+5.0%
Biological and Environmental Research	7,447	6,814	6,646	-168	-2.5%
Science Program Direction	163	0	0	0	0.0%
Total, Sandia National Laboratories	51,499	66,070	72,578	+6,508	+9.9%
Savannah River Site					
Westinghouse - Savannah River					
Fusion Energy Sciences	45	45	44	-1	-2.2%
Biological and Environmental Research	653	803	232	-571	-71.1%
Total, Westinghouse – Savannah River	698	848	276	-572	-67.5%
Savannah River Site Office					
Biological and Environmental Research	6,800	7,599	7,776	+177	+2.3%
Total, Savannah River Site	7,498	8,447	8,052	-395	-4.7%

	(dollars in thousands)				
	FY 2003	FY 2004	FY 2005	$ Change	% Change
Headquarters					
Basic Energy Sciences	5,486	72,009	148,791	+76,782	+106.6%
Advanced Scientific Computing Research	2,218	69,780	72,586	+2,806	+4.0%
Fusion Energy Sciences	1,472	14,324	21,759	+7,435	+51.9%
High Energy Physics	16,073	76,484	84,866	+8,382	+11.0%
Nuclear Physics	1,590	26,669	25,040	-1,629	-6.1%
Biological and Environmental Research	2,395	207,024	107,396	-99,628	-48.1%
Workforce Development for Teachers and Scientists	118	937	132	-805	-85.9%
Science Laboratories Infrastructure	4,285	12,975	0	-12,975	-100.0%
Science Program Direction	61,015	66,101	65,512	-589	-0.9%
Safeguards and Security	330	335	337	+2	+0.6%
Total, Headquarters	94,982	546,638	526,419	-20,219	-3.7%
Subtotal, Science	3,327,849	3,515,767	3,437,323	-78,444	-2.2%
Use of Prior Year Balances	0	-10,000	0	+10,000	+100.0%
Less Security Charge for Reimbursable Work	-5,605	-5,598	-5,605	-7	-0.1%
Total, Science	3,322,244	3,500,169	3,431,718	-68,451	-2.0%

Site Description

Ames Laboratory

Introduction

Ames Laboratory is a Multiprogram Laboratory located on 10 acres of land owned by the University of Iowa, in Ames, Iowa. The laboratory consists of 10 buildings (320,000 gross square feet of space) with the average age of the buildings being 39 years.

The laboratory was built on the campus of Iowa State University during World War II to emphasize the purification and science of rare earth materials. Ames conducts fundamental research in the physical, chemical, and mathematical sciences associated with energy generation and storage. Ames is a national center for the synthesis, analysis, and engineering of rare-earth metals and their compounds.

Basic Energy Sciences

Ames supports experimental and theoretical research on rare earth elements in novel mechanical, magnetic, and superconducting materials. Ames scientists are experts on magnets, superconductors, and quasicrystals that incorporate rare earth elements. It supports theoretical studies for the prediction of molecular energetics and chemical reaction rates and provides leadership in analytical and separations chemistry.

Ames is home to the **Materials Preparation Center** (MPC), which is dedicated to the preparation, purification, and characterization of rare-earth, alkaline-earth, and refractory metal and oxide materials. Established in 1981, the MPC is a one-of-a-kind resource that provides scientists at university, industrial, and government laboratories with research and developmental quantities of high purity materials and unique analytical and characterization services that are not available from commercial suppliers. The MPC is renowned for its technical expertise in alloy design and for creating materials that exhibit ultrafine microstructures, high strength, magnetism, and high conductivity.

Advanced Scientific Computing Research

Ames conducts research in computer science and participates on one of the SciDAC teams. Ames also participates in Integrated Software Infrastructure Center activities that focus on specific software challenges confronting users of terascale computers.

Biological and Environmental Research

Ames, conducts research into new biological imaging techniques such as the study of gene expression in real time and fluorescence spectroscopy to study environmental carcinogens.

Safeguards and Security

This program coordinates planning, policy, implementation, and oversight in the areas of security systems, protective forces, personnel security, material control and accountability, and cyber security. A protective force is maintained to provide protection of personnel, equipment, and property from acts of theft, vandalism, and sabotage through facility walk-through, monitoring of electronic alarm systems, and emergency communications.

Argonne National Laboratory

Introduction

Argonne National Laboratory (ANL) in Argonne, Illinois, is a Multiprogram Laboratory located on 1,700 acres in suburban Chicago. The laboratory consists of 106 buildings (4.6 million gross square feet of space) with the average age of the buildings being 32 years. ANL has a satellite site located in Idaho Falls, Idaho.

Basic Energy Sciences

ANL is home to research activities in broad areas of materials and chemical sciences. It is also the site of three user facilities -- the Advanced Photon Source, the Intense Pulsed Neutron Source, and the Electron Microscopy Center for Materials Research.

The **Advanced Photon Source** (APS) is one of only three third-generation, hard x-ray synchrotron radiation light sources in the world. The 1,104-meter circumference facility -- large enough to house a baseball park in its center -- includes 34 bending magnets and 34 insertion devices, which generate a capacity of 68 beamlines for experimental research. Instruments on these beamlines attract researchers to study the structure and properties of materials in a variety of disciplines, including condensed matter physics, materials sciences, chemistry, geosciences, structural biology, medical imaging, and

environmental sciences. The high-quality, reliable x-ray beams at the APS have already brought about new discoveries in materials structure.

The **Intense Pulsed Neutron Source** (IPNS) is a short-pulsed spallation neutron source that first operated all of its instruments in the user mode in 1981. Twelve neutron beam lines serve 14 instruments. Distinguishing characteristics of IPNS include its innovative instrumentation and source technology and its dedication to serving the users. The first generation of virtually every pulsed source neutron scattering instrument was developed at IPNS. In addition, the source and moderator technologies developed at IPNS, including uranium targets, liquid hydrogen and methane moderators, solid methane moderators, and decoupled reflectors, have impacted spallation sources worldwide. Research at IPNS is conducted on the structure of high-temperature superconductors, alloys, composites, polymers, catalysts, liquids and non-crystalline materials, materials for advanced energy technologies, and biological materials.

The **Electron Microscopy Center for Materials Research** (EMC) provides in-situ, high-voltage and intermediate voltage, high-spatial resolution electron microscope capabilities for direct observation of ion-solid interactions during irradiation of samples with high-energy ion beams. The EMC employs both a tandem accelerator and an ion implanter in conjunction with a transmission electron microscope for simultaneous ion irradiation and electron beam microcharacterization. It is the only instrumentation of its type in the Western Hemisphere. The unique combination of two ion accelerators and an electron microscope permits direct, real-time, in-situ observation of the effects of ion bombardment of materials and consequently attracts users from around the world. Research at EMC includes microscopy based studies on high-temperature superconducting materials, irradiation effects in metals and semiconductors, phase transformations, and processing related structure and chemistry of interfaces in thin films.

Advanced Scientific Computing Research

ANL conducts basic research in mathematics and computer science, as well as research in advanced computing software tools and collaboratory tools. ANL also participates in several scientific applications and collaboratory pilot projects as well as supporting an advanced computing research testbed and participates on a number of the SciDAC teams. It also focuses on testing and evaluating leading edge research computers and participates in Integrated Software Infrastructure Center activities that focus on specific software challenges confronting users of terascale computers.

Fusion Energy Sciences

Argonne contributes to a variety of enabling R&D program activities. It has a lead role internationally in analytical models and experiments for liquid metal cooling in fusion devices. Studies of coatings for candidate structural alloy materials are conducted in a liquid lithium flow loop. Argonne's capabilities in the engineering design of fusion energy systems have contributed to the design of components, as well as to analysis supporting the studies of fusion power plant concepts.

High Energy Physics

HEP supports a program of physics research and technology R&D, using unique capabilities of the laboratory in the areas of advanced accelerator and computing techniques.

Nuclear Physics

The major ANL activity is the operation and research program at the ATLAS national user facility. Other activities include a Medium Energy group which carries out a program of research at TJNAF, Fermilab, RHIC and DESY in Germany; R&D directed towards the possible Rare Isotope Accelerator (RIA) facility; a Nuclear Theory group, which carries out theoretical calculations and investigations in subjects supporting the experimental research programs in Medium Energy and Low Energy physics; and data compilation and evaluation activities as part of the National Nuclear Data Program.

The **Argonne Tandem Linac Accelerator System (ATLAS)** facility provides variable energy, precision beams of stable ions from protons through uranium, at energies near the Coulomb barrier (up to 10 MeV per nucleon) using a superconducting linear accelerator. Most work is performed with stable heavy-ion beams; however, about 6% of the beams are exotic (radioactive) beams. The ATLAS facility features a wide array of experimental instrumentation, including a world-leading ion-trap apparatus, the Advanced Penning Trap. The Gammasphere detector, coupled with the Fragment Mass Analyzer, is a unique world facility for measurement of nuclei at the limits of angular momentum (high-spin states). ATLAS is a world leader in superconducting linear accelerator technology, with particular application to the possible Rare Isotope Accelerator (RIA) facility. The combination of versatile beams and powerful instruments enables the ~230 users annually at ATLAS to conduct research in a broad program in nuclear structure and dynamics, nuclear astrophysics, and fundamental interaction studies.

Biological and Environmental Research

ANL operates a high-throughput national user facility for protein crystallography at the Advanced Photon Source. In support of climate change research, it coordinates the operation and development of the Southern Great Plains, Tropical Western Pacific, and North Slope of Alaska ARM sites. Research is conducted to understand the molecular control of genes and gene pathways in microbes. In conjunction with ORNL and PNNL and six universities, ANL co-hosts the terrestrial carbon sequestration research consortium, Carbon Sequestration in Terrestrial Ecosystems (CSiTE).

Science Laboratories Infrastructure

The SLI program enables the conduct of Departmental research missions at the laboratory by funding line item construction to maintain the general purpose infrastructure and the cleanup and removal of excess facilities. The laboratory also provides Payments in Lieu of Taxes (PILT) to local communities around the laboratory.

Safeguards and Security

This program provides protection of nuclear materials, classified matter, government property, and other vital assets from unauthorized access, theft, diversion, sabotage, espionage, and other hostile acts that may cause risks to national security, the health and safety of DOE and contractor employees, the public, or the environment. Program activities include security systems, material control and accountability, information and cyber security, and personnel security. In addition, a protective force is maintained. These activities ensure that the facility, personnel, and assets remain safe from potential threats.

Brookhaven National Laboratory

Introduction

Brookhaven National Laboratory (BNL) is a Multiprogram Laboratory located on 5,200 acres in Upton, New York. The laboratory consists of 371 buildings (4.1 million gross square feet of space) with the average age of the buildings being 34 years. BNL creates and operates major facilities available to university, industrial, and government personnel for basic and applied research in the physical, biomedical, and environmental sciences, and in selected energy technologies.

Basic Energy Sciences

BNL conducts major research efforts in materials and chemical sciences as well as to efforts in geosciences and biosciences. It is also the site of the National Synchrotron Light Source (NSLS).

The **National Synchrotron Light Source** is among the largest and most diverse scientific user facilities in the world. The NSLS, commissioned in 1982, has consistently operated at >95% reliability 24 hours a day, seven days a week, with scheduled periods for maintenance and machine studies. Adding to its breadth is the fact that the NSLS consists of two distinct electron storage rings. The x-ray storage ring is 170 meters in circumference and can accommodate 60 beamlines or experimental stations, and the vacuum-ultraviolet (VUV) storage ring can provide 25 additional beamlines around its circumference of 51 meters. Synchrotron light from the x-ray ring is used to determine the atomic structure of materials using diffraction, absorption, and imaging techniques. Experiments at the VUV ring help solve the atomic and electronic structure as well as the magnetic properties of a wide array of materials. These data are fundamentally important to virtually all of the physical and life sciences as well as providing immensely useful information for practical applications. The petroleum industry, for example, uses the NSLS to develop new catalysts for refining crude oil and making by-products like plastics.

Advanced Scientific Computing Research

BNL has a computing capability for Quantum Chromodynamics (QCD) simulations and participates on one of the SciDAC teams. It also participates in Integrated Software Infrastructure Center activities that focus on specific software challenges confronting users of terascale computers.

High Energy Physics

HEP supports a program of physics research and technology R&D, using unique capabilities of the laboratory, including the Accelerator Test Facility and its capability for precise experimental measurement.

Nuclear Physics

Research activities include use of polarized protons in the Relativistic Heavy Ion Collider (RHIC) to understand the internal “spin” structure of the protons, the Laser Electron Gamma Source (LEGS) group, that uses a unique polarized photon beam to carry out a program of photonuclear spin physics at the National Synchrotron Light Source (NSLS), research primarily in the area of relativistic heavy ion physics, an important role in the research program at the Sudbury Neutrino Observatory (SNO) that is measuring the solar neutrino flux, and the National Nuclear Data Center (NNDC) that is the central U.S. site for national and international nuclear data and compilation efforts.

The Relativistic Heavy Ion Collider (RHIC) Facility, completed in 1999, is a major new and unique international facility used by about 1,100 scientists from 19 countries. RHIC uses the Tandem Van de Graaff, Booster Synchrotron, and Alternating Gradient Synchrotron (AGS) accelerators in combination to inject beams into two rings of superconducting magnets of almost 4 km circumference with 6 intersection regions where the beams collide. It can accelerate and collide a variety of heavy ions, including gold beams, up to an energy of 100 GeV per nucleon. RHIC will search for the predicted "quark-gluon plasma," a form of nuclear matter thought to have existed microseconds after the "Big Bang."

The **Alternating Gradient Synchrotron (AGS)** provides high intensity pulsed proton beams up to 33 GeV on fixed targets and secondary beams of kaons, muons, pions, and anti-protons. The AGS is the injector of (polarized) proton and heavy-ion beams into RHIC, and its operations are supported by the Heavy Ion subprogram as part of the RHIC facility. Operation of the AGS for fixed targets and secondary beams for medium energy physics experiments was terminated in FY 2003; however, the AGS will still be utilized to produce beams for tests of proton radiography for NNSA and for radiation damage studies of electronic systems for NASA supported work, among a variety of uses, with the support for these activities being provided by the relevant agencies.

The **Booster** Synchrotron, part of the RHIC injector, is providing heavy-ion beams to a dedicated beam line (NASA Space Radiation Laboratory) for biological and electronic systems radiation studies funded by NASA as a Work-for-Others project completed in FY 2003. Operational costs for this facility are being provided by NASA.

The **National Nuclear Data Center (NNDC)** is the central U.S. site for national and international nuclear data and compilation efforts. The U.S. Nuclear Data program is the United States repository for information generated in low- and intermediate-energy nuclear physics research worldwide. This information consists of both bibliographic and numeric data. The NNDC is a resource that maintains the U.S. expertise in low- and intermediate-energy nuclear physics by providing evaluated nuclear data for the user community. The NNDC is assisted in carrying out this responsibility by other Nuclear Data program funded scientists at U.S. National Laboratories and universities.

Biological and Environmental Research

BNL operates the beam lines for protein crystallography at the NSLS for use by the national biological research community, research in biological structure determination, and research into new instrumentation for detecting x-rays and neutrons. Research is also conducted on the molecular mechanisms of cell responses to low doses of radiation.

The radiotracer chemistry, radiopharmaceutical technology, and magnetic resonance imaging research and development programs support applications of novel techniques for imaging brain function in normal and diseased states, and to study the biochemical basis of disease.

Climate change research includes the operation of the ARM External Data resource that provides ARM investigators with data from non-ARM sources, including satellite and ground-based systems. BNL scientists form an important part of the science team in the Atmospheric Sciences program, providing special expertise in atmospheric field campaigns and aerosol research. BNL scientists play a leadership role in the development of, and experimentation at, the Free-Air Carbon Dioxide Enhancement (FACE) facility at the Duke Forest used to understand how plants respond to elevated carbon dioxide concentrations in the atmosphere.

Science Laboratories Infrastructure

The SLI program enables the conduct of Departmental research missions at the laboratory by funding line item construction to maintain the general purpose infrastructure and the cleanup and removal of excess facilities. The laboratory also provides Payments in Lieu of Taxes (PILT) to local communities around the laboratory.

Safeguards and Security

S&S program activities are focused on protective forces, cyber security, physical security, and material control and accountability. BNL operates a transportation division to move special nuclear materials around the site. Material control and accountability efforts focus on accurately accounting for and protecting the site's special nuclear materials.

Chicago Operations Office

Chicago supports the Department's programmatic missions in Science and Technology, National Nuclear Security, Energy Resources, and Environmental Quality by providing expertise and assistance in such areas as contract management, procurement, project management, engineering, property management, construction, human resources, financial management, general and patent law, environmental protection, quality assurance, integrated safety management, integrated safeguards and security management, nuclear material control and accountability, and emergency management. Chicago directly supports Site Offices responsible for program management oversight of seven major management and operating laboratories--Argonne National Laboratory, Brookhaven National Laboratory, Fermi National Accelerator Laboratory, Lawrence Berkeley National Laboratory, Princeton Plasma Physics Laboratory, Stanford Linear Accelerator Center, and Ames Laboratory; and New Brunswick Laboratory, a government-owned and government-operated Federal laboratory. Chicago serves as SC's grant center, administering grants to universities as determined by the DOE-SC Program Offices as well as non-SC offices.

Fermi National Accelerator Laboratory

Introduction

Fermi National Accelerator Laboratory (Fermilab) is a program-dedicated laboratory (High Energy Physics) located on a 6,800-acre site in Batavia, Illinois. The laboratory consists of 337 buildings (2.2 million gross square feet of space) with the average age of the buildings being 38 years. Fermilab is the largest U.S. laboratory for research in high-energy physics and is second only to CERN, the European Laboratory for Particle Physics, in the world. About 2,500 scientific users, scientists from universities and laboratories throughout the U.S. and around the world, use Fermilab for their research. Fermilab's mission is the goal of high-energy physics: to learn what the universe is made of and how it works.

Advanced Scientific Computing Research

Fermilab conducts research in networking and collaboratories.

High Energy Physics

Fermilab operates the Tevatron accelerator and colliding beam facility, which consists of a four-mile ring of superconducting magnets and two large multi-purpose detectors, and is capable of accelerating protons and antiprotons to an energy of one trillion electron volts (1 TeV). The Tevatron is the highest energy proton accelerator in the world, and will remain so until the LHC begins commissioning in 2007. With the shutdown of the LEP machine at CERN in Switzerland in 2000, the Tevatron became the only operating particle accelerator at the energy frontier. The Tevatron complex also includes the Booster and the Main Injector, pre-accelerators to the Tevatron. The Main Injector is also used to produce antiprotons for the Tevatron and will be used independently of the Tevatron for a 120 GeV fixed target program, including NuMI beamline which starts operation in 2005. The Booster is used to accelerate low-energy protons, and a small part of the beam that is not used for Tevatron collider operations is provided to produce neutrinos for short-baseline oscillation experiments. Fermilab and SLAC are the principal experimental facilities of the DOE High Energy Physics program.

Science Laboratories Infrastructure

The SLI program enables the conduct of Departmental research missions at the laboratory by funding line item construction to maintain the general purpose infrastructure and the cleanup and removal of excess facilities.

Safeguards and Security

S&S program efforts are directed at maintaining protective force staffing and operations to protect personnel and the facility, and toward continuing the cyber security, security systems, and material control and accountability programs to accurately account for and protect the facility's special nuclear materials. Limited funding increases would be applied to security systems and the Foreign Visits and Assignments program.

Idaho National Engineering and Environmental Laboratory

Introduction

Idaho National Environmental and Engineering Laboratory (INEEL) is a Multiprogram Laboratory located on 572,000 acres in Idaho Falls, Idaho. Within the laboratory complex are nine major applied engineering, interim storage and research and development facilities, operated by Bechtel, B&W Idaho for the U.S. Department of Energy.

Basic Energy Sciences

INEEL supports studies to understand and improve the life expectancy of material systems used in engineering such as welded systems and to develop new diagnostic techniques for engineering systems.

Fusion Energy Sciences

Since 1978, INEEL has been the lead laboratory for fusion safety. As such, it has helped to develop the fusion safety database that will demonstrate the environmental and safety characteristics of both nearer term fusion devices and future fusion power plants. Research at INEEL focuses on the safety aspects of magnetic fusion concepts for existing and planned domestic experiments and developing further our

domestic safety database using existing collaborative arrangements to conduct work on international facilities. In addition, with the shutdown of the Tritium Systems Test Assembly (TSTA) facility at LANL, INEEL will expand their research and facilities capabilities to include tritium science activities. In FY 2003, INEEL will complete a small tritium laboratory (Safety and Tritium Applied Research Facility).

Biological and Environmental Research

Using unique DOE capabilities such as advanced software for controlling neutron beams and calculating dose, INEEL supports research into boron chemistry, radiation dosimetry, analytical chemistry of boron in tissues, and engineering of new computational systems for application of radiation treatment to tumors, including brain tumors. Research is also supported into the analytical chemistry of complex environmental and biological systems using the technique of mass spectrometry.

Lawrence Berkeley National Laboratory

Introduction

Lawrence Berkeley National Laboratory (LBNL) is a Multiprogram Laboratory located in Berkeley, California, on a 200-acre site adjacent to the Berkeley campus of the University of California. The laboratory consists of 107 buildings (1.68 million gross square feet of space) with the average age of the buildings being 34 years. LBNL is dedicated to performing leading-edge research in the biological, physical, materials, chemical, energy, and computer sciences.

Basic Energy Sciences

LBNL is home to major research efforts in materials and chemical sciences as well as to efforts in geosciences, engineering, and biosciences. Collocated with the University of California at Berkeley, the Laboratory benefits from regular collaborations and joint appointments with numerous outstanding faculty members. The Laboratory is the home to the research of many students and postdoctoral appointees. It is also the site of two BES supported user facilities -- the Advanced Light Source (ALS) and the National Center for Electron Microscopy (NCEM).

The **Advanced Light Source** began operations in October 1993 and now serves over 1,000 users as one of the world's brightest sources of high-quality, reliable vacuum-ultraviolet (VUV) light and long wavelength (soft) x-rays. Soft x-rays and VUV light are used by the researchers at the ALS as high-resolution tools for probing the electronic and magnetic structure of atoms, molecules, and solids, such as those for high-temperature superconductors. The high brightness and coherence of the ALS light are particularly suited for soft x-ray imaging of biological structures, environmental samples, polymers, magnetic nanostructures, and other inhomogeneous materials. Other uses of the ALS include holography, interferometry, and the study of molecules adsorbed on solid surfaces. The pulsed nature of the ALS light offers special opportunities for time resolved research, such as the dynamics of chemical reactions. Shorter wavelength x-rays are also used at structural biology experimental stations for x-ray crystallography and x-ray spectroscopy of proteins and other important biological macromolecules. The ALS is a growing facility with a lengthening portfolio of beamlines that has already been applied to make important discoveries in a wide variety of scientific disciplines.

The **National Center for Electron Microscopy** provides instrumentation for high-resolution, electron-optical microcharacterization of atomic structure and composition of metals, ceramics, semiconductors, superconductors, and magnetic materials. This facility contains one of the highest resolution electron microscopes in the U.S.

Advanced Scientific Computing Research

LBNL conducts basic research in the mathematics and computer science, as well as research in advanced computing software tools and collaboratory tools. It participates in several scientific application and collaboratory pilot projects and participates on a number of the SciDAC teams. LBNL manages the Energy Sciences Network (ESnet). ESnet is one of the worlds most effective and progressive science-related computer networks that provides worldwide access and communications to Department of Energy facilities. LBNL is also the site of the National Energy Research Scientific Computing Center (NERSC), which provides a range of high-performance, state-of-the-art computing resources that are a critical element in the success of many SC research programs. LBNL participates in Integrated Software Infrastructure Center activities that focus on specific software challenges confronting users of terascale computers.

Fusion Energy Sciences

The laboratory's current mission is to study and apply the physics of heavy ion beams and to advance related accelerator technologies. LBNL, LLNL, and PPPL work together in advancing the physics of heavy ion drivers through the Heavy Ion Fusion Virtual National Laboratory.

High Energy Physics

LBNL supports a program of physics research and technology R&D, using unique capabilities of the laboratory primarily in the areas of superconducting magnet R&D, world-forefront expertise in laser driven particle acceleration, expertise in design of advanced electronic devices, and design of modern, complex software codes for acquisition and analysis of data from HEP experiments.

Nuclear Physics

The Low Energy (LE) subprogram has supported operations and the research program of the 88-Inch Cyclotron, whose operations are transitioning in FY 2004 to a dedicated in-house facility. Other activities include the development of a next-generation gamma-ray detector system, GRETINA; the development of the STAR detector, and a smaller activity directed towards development of the ALICE detector within the heavy ion program at the Large Hadron Collider at CERN; the implementation and operation of the Sudbury Neutrino Observatory (SNO) detector in Canada and the KamLAND detector in Japan that are performing neutrino studies; a program with emphasis on the theory of relativistic heavy ion physics; activities supporting the National Nuclear Data Center at BNL; and a technical effort in RIA R&D with the development of electron-cyclotron resonance (ECR) ion sources.

Biological and Environmental Research

LBNL is one of the major national laboratory partners that comprise the Joint Genome Institute (JGI) whose principal goals are high-throughput DNA sequencing techniques and studies on the biological functions associated with newly sequenced human DNA. The laboratory also conducts research on the molecular mechanisms of cell responses to low doses of radiation and on the use of model organisms to

understand and characterize the human genome. LBNL operates beam lines for determination of protein structure at the Advanced Light Source for use by the national and international biological research community, research into new detectors for x-rays, and research into the structure of proteins, including membrane proteins. The nuclear medicine program supports research into novel radiopharmaceuticals for medical research and studies of novel instrumentation for imaging of living systems for medical diagnosis. LBNL also supports the Natural and Accelerated Bioremediation Research (NABIR) program and the geophysical and biophysical research capabilities for NABIR field sites.

LBNL conducts research into new technologies for the detailed characterization of complex environmental contamination. It also develops scalable implementation technologies that allow widely used climate models to run effectively and efficiently on massively parallel processing supercomputers. The carbon cycle field experiment at the ARM Southern Great Plains site is maintained and operated by LBNL.

Science Laboratories Infrastructure

The SLI program enables the conduct of Departmental research missions at the laboratory by funding line item construction to maintain the general purpose infrastructure and the cleanup and removal of excess facilities.

Safeguards and Security

The S&S program provides physical protection of personnel and laboratory facilities. This is accomplished with protective forces, security systems, cyber security, personnel security, and material control and accountability of special nuclear material.

Lawrence Livermore National Laboratory

Introduction

Lawrence Livermore National Laboratory (LLNL) is a Multiprogram Laboratory located on 821 acres in Livermore, California. This laboratory was built in Livermore as a weapons laboratory 42 miles from the campus of the University of California at Berkeley to take advantage of the expertise of the university in the physical sciences.

Basic Energy Sciences

LLNL supports research in positron materials science, superplasticity in alloys, adhesion and bonding at interfaces, and kinetics of phase transformations in welds; and geosciences research on the sources of electromagnetic responses in crustal rocks, seismology theory and modeling, the mechanisms and kinetics of low-temperature geochemical processes and the relationships among reactive fluid flow, geochemical transport and fracture permeability.

Advanced Scientific Computing Research

LLNL participates in base Advanced Scientific Computing research and SciDAC efforts. It also participates in Integrated Software Infrastructure Center activities that focus on specific software challenges confronting users of terascale computers.

Fusion Energy Sciences

LLNL works with LBNL on the physics of heavy ion beam. The LLNL program also includes collaborations with General Atomics on the DIII-D tokamak, operation of an innovative concept experiment, the Sustained Spheromak Physics Experiment (SSPX) at LLNL, and benchmarking of fusion physics computer models with experiments such as DIII-D. It carries out research in the simulation of turbulence and its effect on transport of heat and particles in magnetically confined plasmas. LLNL, LBNL, and PPPL work together in advancing the physics of heavy ion drivers through the Heavy Ion Fusion Virtual National Laboratory.

High Energy Physics

LLNL supports a program of physics research and technology R&D at LLNL, using unique capabilities of the laboratory primarily in the areas of experimental research and advanced accelerator R&D.

Nuclear Physics

The LLNL program supports research in nuclear structure studies, in relativistic heavy ion experiments as part of the PHENIX collaboration, for nuclear data and compilation activities, and for a technical effort involved in RIA R&D.

Biological and Environmental Research

LLNL is one of the major national laboratory partners that comprise the Joint Genome Institute (JGI) whose principal goals are high-throughput DNA sequencing and studies on the biological functions associated with newly sequenced human DNA. It also conducts research on the molecular mechanisms of cell responses to low doses of radiation, and on the use of model organisms to understand and characterize the human genome.

Through the program for Climate Model Diagnosis and Intercomparison, LLNL provides the international leadership to understand and improve climate models. Virtually every climate modeling center in the world participates in this unique program.

Los Alamos National Laboratory

Introduction

Los Alamos National Laboratory (LANL) is a Multiprogram Laboratory located on 27,000 acres in Los Alamos, New Mexico.

Basic Energy Sciences

LANL is home to major research efforts in materials sciences with other efforts in chemical sciences, geosciences, and engineering. It is also the site of the Manuel Lujan Jr., Neutron Scattering Center at the Los Alamos Neutron Science Center (LANSCE). LANL supports research on strongly correlated electronic materials, high-magnetic fields, microstructures, deformation, alloys, bulk ferromagnetic glasses, mechanical properties, ion enhanced synthesis of materials, metastable phases and microstructures, and mixtures of particles in liquids.

Research is also supported to understand the electronic structure and reactivity of actinides through the study of organometallic compounds. Also supported is work to understand the chemistry of plutonium and other light actinides in both near-neutral pH conditions and under strongly alkaline conditions relevant to radioactive wastes and research in physical electrochemistry fundamental to energy storage systems. In the areas of geosciences, experimental and theoretical research is supported on rock physics, seismic imaging, the physics of the earth's magnetic field, fundamental geochemical studies of isotopic equilibrium/disequilibrium, and mineral-fluid-microbial interactions.

The **Los Alamos Neutron Science Center** provides an intense pulsed source of neutrons for both national security research and civilian research. LANSCE is comprised of a high-power 800-MeV proton linear accelerator, a proton storage ring, production targets to the Manuel Lujan Jr. Neutron Scattering Center and the Weapons Neutron Research facility, and a variety of associated experiment areas and spectrometers. The Lujan Center features instruments for measurement of high-pressure and high-temperature samples, strain measurement, liquid studies, and texture measurement. The facility has a long history and extensive experience in handling actinide samples. A new 30 Tesla magnet is available for use with neutron scattering to study samples in high-magnetic fields.

Advanced Scientific Computing Research

LANL conducts basic research in the mathematics and computer science and in advanced computing software tools. It also participates in several scientific application and collaboratory pilot projects and participates on a number of the SciDAC teams. LANL participates in Integrated Software Infrastructure Center activities that focus on specific software challenges confronting users of terascale computers.

Fusion Energy Sciences

LANL supports the creation of computer codes for modeling the stability of plasmas, as well as work in diagnostics, innovative fusion plasma confinement concepts such as Magnetized Target Fusion, and the removal of the remainder of the recoverable tritium from and completion of the stabilization of the Tritium Systems Test Assembly facility prior to turning the facility over to the Office of Environmental Management for Decontamination and Decommissioning at the end of FY 2003.

High Energy Physics

HEP supports a program of physics research and technology R&D at LANL, using unique capabilities of the laboratory primarily in the area of theoretical studies, experimental research, and development of computational techniques for accelerator design.

Nuclear Physics

NP supports a broad program of research including: a program of neutron beam research that utilizes beams from the LANSCE facility to make fundamental physics measurements, such as the development of an experiment to search for the electric dipole moment of the neutron; a relativistic heavy ion effort using the PHENIX detector at the Relativistic Heavy Ion Collider (RHIC); research directed at the study of the quark substructure of the nucleon in experiments at Fermilab, and at the "spin" structure of nucleons at RHIC using polarized proton beams; the development of the Sudbury Neutrino Observatory (SNO) and MiniBooNE research programs measuring neutrino; a broad program of theoretical research; nuclear data and compilation activities as part of the national nuclear data program; and a technical effort involved in RIA R&D.

Biological and Environmental Research

LANL is one of the major national laboratory partners that comprise the Joint Genome Institute (JGI) whose principal goals are high-throughput DNA sequencing and studies on the biological functions associated with newly sequenced human DNA. One of LANL's roles in the JGI involves the production of high quality "finished" DNA sequence. It also conducts research on the molecular mechanisms of cell responses to low doses of radiation and on research to understand the molecular control of genes and gene pathways in microbes. Activities in structural biology include the operation of an experimental station for protein crystallography at the Los Alamos Neutron Science Center for use by the national biological research community and research into new techniques for determination of the structure of proteins.

LANL provides the site manager for the Tropical Western Pacific ARM site. LANL also has a crucial role in the development, optimization, and validation of coupled atmospheric and oceanic general circulation models using massively parallel computers. LANL also conducts research into advanced medical imaging technologies for studying brain function and research into new techniques for rapid characterization and sorting of mixtures of cells and cell fragments.

National Renewable Energy Laboratory

Introduction

The National Renewable Energy Laboratory (NREL) is a program-dedicated laboratory (Solar) located on 300 acres in Golden, Colorado. NREL was built to emphasize renewable energy technologies such as photovoltaics and other means of exploiting solar energy. It is the world leader in renewable energy technology development. Since its inception in 1977, NREL's sole mission has been to develop renewable energy and energy efficiency technologies and transfer these technologies to the private sector.

Basic Energy Sciences

NREL supports basic research efforts that underpin this technological emphasis at the Laboratory, for example on overcoming semiconductor doping limits, novel and ordered semiconductor alloys, and theoretical and experimental studies of properties of advanced semiconductor alloys for prototype solar cells. It also supports research addressing the fundamental understanding of solid-state, artificial photosynthetic systems. This research includes the preparation and study of novel dye-sensitized semiconductor electrodes, characterization of the photophysical and chemical properties of quantum dots, and study of charge carrier dynamics in semiconductors.

Oak Ridge Institute for Science and Education

Introduction

The Oak Ridge Institute for Science and Education (ORISE), operated by Oak Ridge Associated Universities (ORAU), is located on a 150-acre site in Oak Ridge, Tennessee. Established in 1946, ORAU is a consortium of 88 colleges and universities. The institute undertakes national and international programs in education, training, health, and the environment. ORISE is an academic and training facility providing specialized scientific and safety training to DOE and other institutions. ORISE is an international leader in radiation-related emergency response and epidemiological studies.

Basic Energy Sciences

ORISE supports a consortium of university and industry scientists to share the ORNL research station at NSLS to study the atomic and molecular structure of matter (known as ORSOAR, the Oak Ridge Synchrotron Organization for Advanced Research). ORISE provides administrative support for panel reviews and site reviews. It also assists with the administration of topical scientific workshops and provides administrative support for other activities such as for the reviews of construction projects. ORISE manages the **Shared Research Equipment (SHaRE)** program at Oak Ridge National Laboratory. The SHaRE program makes available state-of-the-art electron beam microcharacterization facilities for collaboration with researchers from universities, industry, and other government laboratories.

Advanced Scientific Computing Research

ORISE provides support for education activities.

Fusion Energy Sciences

ORISE supports the operation of the Fusion Energy Sciences Advisory Committee and administrative aspects of some FES program peer reviews. It also acts as an independent and unbiased agent to administer the FES Graduate and Postgraduate Fellowship programs, in conjunction with FES, the Oak Ridge Operations Office, participating universities, DOE laboratories, and industries.

High Energy Physics

ORISE provides HEP support in the area of program planning and review.

Nuclear Physics

ORISE supports the Holifield Radioactive Ion Beam Facility (HRIBF) and its research program.

Biological and Environmental Research

ORISE coordinates research fellowship programs. It also coordinates activities associated with the peer review of most of the submitted research proposals. ORISE also conducts research into modeling radiation dosages for novel clinical diagnostic and therapeutic procedures.

Science Program Direction

ORISE facilitates and coordinates communication and outreach activities, and conducts studies on workforce trends in the sciences.

Safeguards and Security

The S&S program at ORISE provides physical protection/protective force services by employing unarmed security officers. The facilities are designated as property protection areas for the purpose of protecting government owned assets. In addition to the government owned facilities and personal property, ORISE possesses small quantities of nuclear materials that must be protected. The program includes information security, personnel security, protective forces, security systems, and cyber security.

Oak Ridge National Laboratory

Introduction

Oak Ridge National Laboratory (ORNL) is a Multiprogram Laboratory located on 24,000 acres in Oak Ridge, Tennessee. The laboratory's 1,100 acre main site on Bethel Valley Road contains 335 buildings (3 million gross square feet of space) with the average age of the buildings being 33 years. Scientists and engineers at ORNL conduct basic and applied research and development to create scientific knowledge and technological solutions that strengthen the nation's leadership in key areas of science; increase the availability of clear, abundant energy; restore and protect the environment; and contribute to national security.

Basic Energy Sciences

ORNL is home to major research efforts in materials and chemical sciences with additional programs in engineering and geosciences. It is the site of the High Flux Isotope Reactor (HFIR) and the Radiochemical Engineering Development Center (REDC). ORNL also is the site of the Spallation Neutron Source (SNS), which is under construction and scheduled for commissioning in FY 2006. ORNL has perhaps the most comprehensive materials research program in the country.

The **High Flux Isotope Reactor** is a light-water cooled and moderated reactor that began full-power operations in 1966. HFIR operates at 85 megawatts to provide state-of-the-art facilities for neutron scattering, materials irradiation, and neutron activation analysis and is the world's leading source of elements heavier than plutonium for research, medicine, and industrial applications. The neutron scattering experiments at HFIR reveal the structure and dynamics of a very wide range of materials. The neutron-scattering instruments installed on the four horizontal beam tubes are used in fundamental studies of materials of interest to solid-state physicists, chemists, biologists, polymer scientists, metallurgists, and colloid scientists. Recently, a number of improvements at HFIR have increased its neutron scattering capabilities to 14 state-of-the-art neutron scattering instruments on the world's brightest beams of steady-state neutrons. These upgrades include the installation of larger beam tubes and shutters, a high-performance liquid hydrogen cold source, and neutron scattering instrumentation.

The **Radiochemical Engineering Development Center**, located adjacent to HFIR, provides unique capabilities for the processing, separation, and purification of transplutonium elements.

Advanced Scientific Computing Research

ORNL conducts basic research in the mathematics and computer science, as well as research in advanced computing software tools and collaboratory tools. It also participates in several scientific application and collaboratory pilot projects and participates on a number of the SciDAC teams. Advanced Computing Research Testbeds (ACRTs) are focused on the evaluation of leading edge research computers. Integrated Software Infrastructure Center activities are focused on specific software challenges confronting users of terascale computers.

Fusion Energy Sciences

ORNL develops a broad range of components that are critical for improving the research capability of fusion experiments located at other institutions and that are essential for developing fusion as an environmentally acceptable energy source. The laboratory is a leader in the theory of heating of plasmas

by electromagnetic waves, antenna design, and design and modeling of pellet injectors to fuel the plasma and control the density of plasma particles. Computer codes developed at the laboratory are also used to model plasma processing in industry. While some ORNL scientists are located full-time at off-site locations, others carry out their collaborations with short visits to the host institutions, followed by extensive computer communications from ORNL for data analysis and interpretation, and theoretical studies. ORNL is also a leader in stellarator theory and design and is a major partner with PPPL on the NCSX. It leads the advanced fusion structural materials science program, contributes to research on all materials systems of fusion interest, coordinates experimental collaborations for two U.S.-Japan programs, and coordinates fusion materials activities.

High Energy Physics

A small research effort using unique capabilities of ORNL primarily in the area of particle beam shielding calculations is supported. Through the Scientific Discovery through Advanced Computing (SciDAC) program, ORNL will support an effort to model the physics processes that drive supernova explosions.

Nuclear Physics

The major effort at ORNL is the research and operations of the Holifield Radioactive Ion Beam Facility (HRIBF) that is operated as a national user facility. Also supported are a relativistic heavy ion group that is involved in a research program using the PHENIX detector at RHIC; the development of the fundamental newtron physics beam line at the Spallation Newtron Source; a theoretical nuclear physics effort that emphasizes investigations of nuclear structure and astrophysics; nuclear data and compilation activities that support the national nuclear data effort; and a technical effort involved in RIA R&D.

The **Holifield Radioactive Ion Beam Facility (HRIBF)** is the only radioactive nuclear beam facility in the U.S. to use the isotope separator on-line (ISOL) method and is used annually by about 90 scientists for studies in nuclear structure, dynamics and astrophysics using radioactive beams. The HRIBF accelerates secondary radioactive beams to higher energies (up to 10 MeV per nucleon) than any other facility in the world with a broad selection of ions. The HRIBF conducts R&D on ion sources and low energy ion transport for radioactive beams..

Biological and Environmental Research

ORNL has a leadership role in research focused on the ecological aspects of global environmental change. The Throughput Displacement Experiment at the Walker Branch Watershed is a unique resource for long term ecological experiments. ORNL is the home of the newest FACE experiment. It also houses the ARM archive, providing data to ARM scientists and to the general scientific community. ORNL scientists provide improvement in formulations and numerical methods necessary to improve climate models. ORNL scientists make important contributions to the NABIR program, providing special leadership in microbiology applied in the field. ORNL also manages the NABIR Field Research Center, a field site for developing and testing bioremediation methods for metal and radionuclide contaminants in subsurface environments. ORNL, in conjunction with ANL and PNNL and six universities, co-hosts a terrestrial carbon sequestration research consortium, CSiTE.

ORNL conducts research on widely used data analysis tools and information resources that can be automated to provide information on the biological function of newly discovered genes identified in high-throughput DNA sequencing projects. The laboratory also operates the Laboratory for Comparative

and Functional Genomics, or “Mouse House,” which uses mice as model organisms to understand and characterize the human genome. ORNL conducts research into the application of radioactively labeled monoclonal antibodies in medical diagnosis and therapy, particularly of cancer, as well as research into new instrumentation for the analytical chemistry of complex environmental contamination using new types of biosensors.

Science Laboratories Infrastructure

The SLI program enables the conduct of Departmental research missions at the laboratory by funding line item construction to maintain the general purpose infrastructure and the cleanup and removal of excess facilities. The program also supports SC landlord responsibilities for the 36,000 acre Oak Ridge Reservation, and for Federal facilities in the city of Oak Ridge. The laboratory also provides Payments in Lieu of Taxes (PILT) to local communities around the laboratory.

Safeguards and Security

The S&S program includes security systems, information security, cyber security, personnel security, material control and accountability, and program management. Program planning functions at the Laboratory provide for short- and long-range strategic planning, and special safeguards plans associated with both day-to-day protection of site-wide security interests and preparation for contingency operations. Additionally, ORNL is responsible for providing overall laboratory policy direction and oversight in the security arena; for conducting recurring programmatic self-assessments; for assuring a viable ORNL Foreign Ownership, Control or Influence (FOCI) program is in place; and for identifying, tracking, and obtaining closure on findings or deficiencies noted during inspections, surveys, or assessments of Safeguards and Security programs.

Oak Ridge Operations Office

Introduction

Oak Ridge supports almost every major Departmental mission in science, defense, energy resources, and environmental quality. Oak Ridge provides world-class scientific research capacity while advancing scientific knowledge through such major Departmental initiatives as the Spallation Neutron Source, the Supercomputing program, and in Nanoscience research. Research is conducted at facilities at the Oak Ridge National Laboratory and Thomas Jefferson National Accelerator Facility. In the defense mission area, programs include those which protect our national security by applying advanced science and nuclear technology to the Nation’s defense. Through the Nuclear Nonproliferation program, Oak Ridge supports the development and coordination for the implementation of domestic and international policy aimed at reducing threats, both internal and external, to the U.S. from weapons of mass destruction. Oak Ridge also supports various Energy Efficiency and Renewable Energy programs and facilitates the R&D on energy efficiency and renewable energy technologies. All of the missions under Oak Ridge management are supported through centralized administrative and specialized technical personnel in the financial, legal, procurement, personnel, security, and various other support organizations.

Science Laboratories Infrastructure

The Oak Ridge Landlord subprogram provides for centralized Oak Ridge Operations Office (ORO) infrastructure requirements and general operating costs for activities on the Oak Ridge Reservation

(ORR) outside plant fences and activities to maintain a viable operations office, including maintenance of roads and grounds, PILT, and other needs related to landlord activities.

Safeguards and Security

The S&S program provides for contractor protective forces for the Federal Office Building and Oak Ridge National Laboratory. This includes protection of a category 1 Special Nuclear Material Facility, Building 3019. Other small activities include security systems, information security, and personnel security.

Office of Scientific and Technical Information

The Office of Scientific and Technical Information (OSTI) is located on an 8-acre site in Oak Ridge, Tennessee. The 133,000 square foot OSTI facility houses both Federal and contractor staff and over 1.2 million classified and unclassified documents dating from the Manhattan Project to the present. The large collection represents a critical component of the OSTI mission to collect, preserve, disseminate, and leverage the scientific and technical information resources of DOE to expand the knowledge base of science and technology and facilitate scientific discovery and application.

Pacific Northwest National Laboratory

Introduction

Pacific Northwest National Laboratory (PNNL) is a Multiprogram Laboratory located on 640 acres at the Department's Hanford site in Richland, Washington. The laboratory consists of 40 government-owned buildings (900,000 gross square feet of space) with the average age of the buildings being 33 years. PNNL conducts research in the area of environmental science and technology and carries out related national security, energy, and human health programs.

Basic Energy Sciences

PNNL supports research in interfacial chemistry of water-oxide systems, near-field optical microscopy of single molecules on surfaces, inorganic molecular clusters, and direct photon and/or electron excitation of surfaces and surface species. Programs in analytical chemistry and in applications of theoretical chemistry to understanding surface catalysis are also supported. Geosciences research includes theoretical and experimental studies to improve our understanding of phase change phenomena in microchannels. Also supported is research on molecularly tailored nanostructured materials, stress corrosion and corrosion fatigue, interfacial dynamics during heterogeneous deformation, irradiation assisted stress corrosion cracking, bulk defect and defect processing in ceramics, chemistry and physics of ceramic surfaces and interfacial deformation mechanisms in aluminum alloys.

Advanced Scientific Computing Research

PNNL conducts basic research in the mathematics and computer science, as well as research in advanced computing software tools and collaboratory tools. It also participates in several scientific application pilot projects, participates on a number of the SciDAC teams, and participates in Integrated Software Infrastructure Center activities that focus on specific software challenges confronting users of terascale computers.

Fusion Energy Sciences

PNNL is focused on research on materials that can survive in a fusion neutron environment. The available facilities used for this research include mechanical testing and analytical equipment, including state-of-the-art electron microscopes, that are either located in radiation shielded hot cells or have been adapted for use in evaluation of radioactive materials after exposure in fission test reactors. Experienced scientists and engineers at PNNL provide leadership in the evaluation of ceramic matrix composites for fusion applications and support work on vanadium, copper and ferritic steels as part of the U.S. fusion materials team. It also plays a leadership role in a fusion materials collaboration with Japan, with Japanese owned test and analytical equipment located in PNNL facilities and used by both PNNL staff and up to ten Japanese visiting scientists per year.

Biological and Environmental Research

PNNL is home to the William R. Wiley **Environmental Molecular Sciences Laboratory** (EMSL). PNNL scientists, including EMSL scientists, play important roles in performing research for NABIR. PNNL operates the unique ultrahigh field mass spectrometry and nuclear magnetic resonance spectrometry instruments at the EMSL for use by the national research community.

PNNL provides the lead scientist for the Environmental Meteorology Program, the G-1 research aircraft, and expertise in field campaigns for atmospheric sampling and analysis. The ARM program office is located at PNNL, as is the ARM chief scientist and the project manager for the ARM engineering activity; this provides invaluable logistical, technical, and scientific expertise for the program. It also conducts research into new instrumentation for microscopic imaging of biological systems and for characterization of complex radioactive contaminants by highly automated instruments.

PNNL conducts research on the molecular mechanisms of cell responses to low doses of radiation and on the development of high throughput approaches for characterizing all of the proteins (the proteome) being expressed by cells under specific environmental conditions.

PNNL, in conjunction with ANL and ORNL and six universities, co-hosts a terrestrial carbon sequestration research consortium: CSiTE. PNNL also conducts research on the integrated assessment of global climate change.

Science Laboratories Infrastructure

The SLI program enables the conduct of Departmental research missions at the laboratory by funding line item construction to maintain the general purpose infrastructure and the cleanup and removal of excess facilities.

Science Program Direction

PNNL conducts assessments of trends in R&D and the development of science management tools, for R&D portfolio and outcome analyses; and provides expert assistance in state-of-the-art science communications. As part of the organizational restructuring of PNNL from an Environmental Management Site to an SC Site, a Pacific Northwest Site Office is being established.

Safeguards and Security

The PNNL S&S program consists of program management, physical security systems, protection operations, information security, cyber security, personnel security and material control and accountability.

Princeton Plasma Physics Laboratory

Introduction

Princeton Plasma Physics Laboratory (PPPL) is a program-dedicated laboratory (Fusion Energy Sciences) located on 72 acres in Princeton, New Jersey. The laboratory consists of 35 buildings (700,000 gross square feet of space) with the average age of the buildings being 28 years.

Advanced Scientific Computing Research

PNNL participates in a collaboratory pilot project and several SciDAC projects.

Fusion Energy Sciences

PPPL is the only U.S. Department of Energy (DOE) laboratory devoted primarily to plasma and fusion science. It hosts experimental facilities used by multi-institutional research teams and also sends researchers and specialized equipment to other fusion facilities in the United States and abroad. It is the host for the NSTX, which is an innovative toroidal confinement device, closely related to the tokamak, and has started construction of another innovative toroidal concept, the NCSX, a compact stellarator. PPPL scientists and engineers have significant involvement in the DIII-D and Alcator C-Mod tokamaks in the U.S. and the large JET (Europe) and JT-60U (Japan) tokamaks abroad. This research is focused on developing the scientific understanding and innovations required for an attractive fusion energy source. PPPL scientists are also involved in several basic plasma science experiments, ranging from magnetic reconnection to plasma processing. It also has a large theory group that does research in the areas of turbulence and transport, equilibrium and stability, wave-plasma interaction, and heavy ion accelerator physics. PPPL, through its association with Princeton University, provides high quality education in fusion-related sciences, having produced more than 175 Ph.D. graduates since it’s founding in 1951. PPPL, LBNL, and LLNL currently work together in advancing the physics of heavy ion drivers through the heavy ion beams Fusion Virtual National Laboratory.

High Energy Physics

PPPL supports a small theoretical research effort using unique capabilities in the area of advanced accelerator R&D.

Science Laboratories Infrastructure

The SLI program enables the conduct of Departmental research missions at the laboratory by funding line item construction to maintain the general purpose infrastructure and the cleanup and removal of excess facilities.

Safeguards and Security

The S&S program provides for protection of nuclear materials, government property, and other vital assets from unauthorized access, theft, diversion, sabotage, or other hostile acts. These activities result in reduced risk to national security and the health and safety of DOE and contractor employees, the public, and the environment.

Richland Operations Office

Richland is responsible for and manages all environmental cleanup and science and technology development at the 560 square mile Hanford Site, coordinating closely with contractor companies hired to manage and complete the work of the world's largest cleanup project.

Sandia National Laboratories

Introduction

Sandia National Laboratories (SNL) is a Multiprogram Laboratory located on 3,700 acres in Albuquerque, New Mexico (SNL/NM), with sites in Livermore, California (SNL/CA), and Tonopah, Nevada.

Basic Energy Sciences

SNL is home to significant research efforts in materials and chemical sciences with additional programs in engineering and geosciences. SNL/CA is also the site of the Combustion Research Facility (CRF). SNL has a historic emphasis on electronic components needed for Defense Programs. The laboratory has very modern facilities in which unusual microcircuits and structures can be fabricated out of various semiconductors.

The **Combustion Research Facility** at SNL/CA is an internationally recognized facility for the study of combustion science and technology. In-house efforts combine theory, modeling, and experiment including diagnostic development, kinetics, and dynamics. Several innovative non-intrusive optical diagnostics such as degenerate four-wave mixing, cavity ring-down spectroscopies, high resolution optical spectroscopy, and ion-imaging techniques have been developed to characterize combustion intermediates. Basic research is often conducted in close collaboration with applied programs. A principal effort in turbulent combustion is coordinated among the chemical physics program, and programs in Fossil Energy and Energy Efficiency and Renewable Energy.

Advanced Scientific Computing Research

SNL conducts basic research in mathematics and computer science, as well as research in advanced computing software tools and collaboratory tools. It also participates in several scientific application and collaboratory pilot projects, participates on a number of the SciDAC teams, and participates in Integrated Software Infrastructure Center activities that focus on specific software challenges confronting users of terascale computers.

Fusion Energy Sciences

Sandia plays a lead role in developing components for fusion devices through the study of plasma interactions with materials, the behavior of materials exposed to high heat fluxes, and the interface of plasmas and the walls of fusion devices. It selects, specifies, and develops materials for components exposed to high heat and particles fluxes and conducts extensive analysis of prototypes to qualify components before their use in fusion devices. Materials samples and prototypes are tested in Sandia's Plasma Materials Test Facility, which uses high-power electron beams to simulate the high heat fluxes expected in fusion environments. Materials and components are exposed to tritium-containing plasmas in the Tritium Plasma Experiment. Tested materials are characterized using Sandia's accelerator facilities for ion beam analysis. Sandia supports a wide variety of domestic and international experiments in the areas of tritium inventory removal, materials postmortem analysis, diagnostics development, and component design and testing.

Biological and Environmental Research

SNL provides the site manager for the North Slope of Alaska ARM site. The chief scientist for the ARM-UAV program is at SNL, and SNL takes the lead role in coordinating and executing ARM-UAV missions. The laboratory conducts advanced research and technology development in robotics, smart medical instruments, microelectronic fabrication, and computational modeling of biological systems.

To support environmental cleanup, SNL conducts research into novel sensors for analytical chemistry of contaminated environments. It also conducts computational and biological research in support of the GTL research program.

Science Program Direction

SNL carries out research in areas of technical program planning and merit review practices. This activity includes assessments of best practices in R&D organizations.

Savannah River Site

Introduction

The Savannah River Site complex covers 198,344 acres, or 310 square miles encompassing parts of Aiken, Barnwell and Allendale counties in South Carolina bordering the Savannah River.

Biological and Environmental Research

The Savannah River Site supports the Savannah River Ecology Laboratory (SREL), a research unit of the University of Georgia operating at the site for over forty years. The SREL conducts research aimed at reducing the cost of environmental cleanup and remediation while ensuring biodiversity to the restored environment. It supports the SREL through a cooperative agreement with the University of Georgia.

Stanford Linear Accelerator Center

Introduction

Stanford Linear Accelerator Center (SLAC) is located on 426 acres of Stanford University land in Menlo Park, California, and is also the home of the Stanford Synchrotron Radiation Laboratory (SSRL). The facility is now comprised of 25 experimental stations and is used each year by over 700 researchers from industry, government laboratories and universities. SLAC (including SSRL) consists of 166 buildings (1.8 million gross square feet of space) with the average age of 27 years. SLAC is a laboratory dedicated to the design, construction and operation of state-of-the-art electron accelerators and related experimental facilities for use in high-energy physics and synchrotron radiation research. SLAC operates the 2 mile long Stanford Linear Accelerator which began operating in 1966. The SSRL was built in 1974 to utilize the intense x-ray beams from the Stanford Positron Electron Accelerating Ring (SPEAR) that was built for particle physics by the SLAC laboratory. Over the years, the SSRL grew to be one of the main innovators in the production and use of synchrotron radiation with the development of wigglers and undulators that form the basis of all third generation synchrotron sources.

Basic Energy Sciences

SLAC is the home of the **Stanford Synchrotron Radiation Laboratory** (SSRL) and peer-reviewed research projects associated with SSRL. Over the years, the SSRL grew to be one of the main innovators in the production and use of synchrotron radiation with the development of wigglers and undulators that form the basis of all third generation synchrotron sources. The facility is used by researchers from industry, government laboratories, and universities. These include astronomers, biologists, chemical engineers, chemists, electrical engineers, environmental scientists, geologists, materials scientists, and physicists. A research program is conducted at SSRL with emphasis in both the x-ray and ultraviolet regions of the spectrum. SSRL scientists are experts in photoemission studies of high-temperature superconductors and in x-ray scattering. The SPEAR 3 upgrade at SSRL provides major improvements that will increase the brightness of the ring for all experimental stations.

Advanced Scientific Computing Research

SLAC participates on a number of SciDAC teams.

High Energy Physics

SLAC operates the B-factory and its detector, BaBar, and a small program of fixed target experiments. The B-factory, a high energy electron-positron collider, was constructed to support a search for and high-precision study of CP symmetry violation in the B meson system. All of these facilities make use of the two-mile long linear accelerator, or linac. SLAC and Fermilab are the principal experimental facilities of the HEP program.

Biological and Environmental Research

SLAC operates nine SSRL beam lines for structural biology. This program involves synchrotron radiation-based research and technology developments in structural molecular biology that focus on protein crystallography, x-ray small angle scattering diffraction, and x-ray absorption spectroscopy for determining the structures of complex proteins of many biological consequences.

Science Laboratories Infrastructure

The SLI program enables the conduct of Departmental research missions at the laboratory by funding line item construction to maintain the general purpose infrastructure and the cleanup and removal of excess facilities.

Safeguards and Security

The S&S program focuses on reducing the risk to DOE national facilities and assets. The program consists primarily of protective forces and cyber security program elements.

Thomas Jefferson National Accelerator Facility (TJNAF)

Introduction

Thomas Jefferson National Accelerator Facility (TJNAF) is a laboratory operated by the Nuclear Physics program located on 162 acres in Newport News, Virginia. The laboratory consists of 65 buildings (500,000 gross sq. ft. of space) with the average age of the buildings being 12 years. Constructed over the period FY 1987-1995 at a cost of $513,000,000, TJNAF began operations in FY 1995.

Nuclear Physics

The centerpiece of TJNAF is the **Continuous Electron Beam Accelerator Facility (CEBAF)**, a unique international electron-beam user facility for the investigation of nuclear and nucleon structure based on the underlying quark substructure that has a user community of ~1200 researchers and is used annually by ~800 U.S. and foreign researchers. Polarized electron beams up to 5.7 GeV can be provided by CEBAF simultaneously to 3 different experimental halls. Hall A is designed for spectroscopy and few-body measurements. Hall B has a large acceptance detector, CLAS, for detecting multiple charged particles coming from a scattering reaction. Hall C is designed for flexibility to incorporate a wide variety of different experiments. Its core equipment consists of two medium resolution spectrometers for detecting high momentum or unstable particles. The G0 detector, a joint NSF-DOE project in Hall C, will allow a detailed mapping of the strange quark contribution to nucleon structure. Also in Hall C, a new detector, Q-weak, to measure the weak charge of the proton, is being developed by a collaboration of laboratory and university groups in partnership with the National Science Foundation.

Biological and Environmental Research

BER supports the development of advanced imaging instrumentation at TJNAF that will ultimately be used in the next generation medical imaging systems.

Science Laboratories Infrastructure

The SLI program enables the conduct of Departmental research missions at the laboratory by funding line item construction to maintain the general purpose infrastructure and the cleanup and removal of excess facilities.

Safeguards and Security

TJNAF has a guard force that provides 24-hour services for the accelerator site and after-hours property protection security for the entire site. Other security programs include cyber security, program management, and security systems.

Washington Headquarters

The Office of Science Headquarters located in the Washington, D.C. area supports the SC mission by funding Federal staff responsible for directing, administering, and supporting a broad spectrum of scientific disciplines. These disciplines include High Energy Physics, Nuclear Physics, Basic Energy Sciences, Biological and Environmental Research, Fusion Energy Sciences and Advanced Scientific Computing Research. In addition, Federal staff responsible for management, policy, personnel, and technical/administrative support activities in budget, finance, grants, contracts, information technology, construction management, safeguards, security, environment, safety, health and general administration. Funded expenses include salaries, benefits, travel, general administrative support services and technical expertise, information technology maintenance and enhancements as well as other costs funded through interdepartmental transfers and interagency transfers.

All Other Sites

The Office of Science funds 272 colleges/universities located in all 50 states and Puerto Rico.

Basic Energy Sciences

The BES program funds research at 168 colleges/universities located in 48 states.

Advanced Scientific Computing Research

The ASCR program funds research at 71 colleges/universities located in 24 states supporting approximately 126 principal investigators.

Fusion Energy Sciences

The FES program funds research at more than 50 colleges and universities located in approximately 30 states. It also funds the DIII-D tokamak experiment and related programs at General Atomics, an industrial firm located in San Diego, California.

High Energy Physics

The HEP program supports about 260 research groups at more than 100 colleges and universities located in 36 states, Washington, D.C., and Puerto Rico. The strength and effectiveness of the university-based program is critically important to the success of the program as a whole.

Nuclear Physics

The NP program funds 185 research grants at 85 colleges/universities located in 35 states. Among these is a cooperative agreement with the Massachusetts Institute of Technology (MIT) for the operation of the Bates Linear Accelerator Center as a national user facility used by about 110 scientists; the Triangle Universities Nuclear Laboratory (TUNL); Texas A&M (TAMU) Cyclotron; the Yale Tandem Van de Graaff; and the University of Washington Tandem Van de Graaff. These accelerator facilities offer niche capabilities and opportunities not available at the national user facilities, or many foreign low-energy laboratories, such as specialized sources and targets, opportunities for extended experiments, and specialized instrumentation. Also supported is the Institute for Nuclear Theory (INT) at the University of Washington, the premier international center for new initiatives and collaborations in nuclear theory research.

Biological and Environmental Research

The BER program funds research at some 220 institutions, including colleges/universities, private industry, and other federal and private research institutions located in 44 states.